



Grade Level:
4th and 5th

Time:
98 Minutes

Season:
All

Objectives:
Students will be able to...

- Understand the roles of salmon in the food web
- Recall an interaction over multiple trophic levels for a salmon life stage

Key Concepts:

- Salmon are a keystone species
- All organisms and ecosystems are interconnected

Salmon Food Web

Lesson 1 of 1

Background & Summary

Students explore the concept of ecosystem interdependence and salmon as a keystone species by creating a food web diagram for each stage of the salmon life cycle. During the warm-up activity, students work in small groups and make food webs based on animals of their choosing. Groups that get stuck, or think they have “completed” their web should be challenged to pick a different animal and try to build a larger food web. The questions are designed to get students thinking conceptually about food web structure, this is also a good time to introduce vocabulary words. When introducing some of the vocabulary, it may be helpful to ask the question in reverse to get a better understanding of the students’ knowledge of the topic. For example, instead of asking “what type of consumers are represented”, ask the student to describe the diet of one of the organisms, and what the dietary components have in common. Use the vocabulary word in a sentence to integrate the students’ description and explain the definition.

The main activity focuses on designing a food web for a specific salmon life cycle. The organisms included in these diagrams should be native to the Pacific Northwest. “Food Web Cards” are included as a resource to help students identify some of these organisms. Alternatively, classrooms with access to computers can encourage groups to research organisms that are not included in the “Food Web Cards”.

Procedure

Food Web Warm-Up Activity

1. Split students into five groups. Give each group a blank piece of paper and a pencil. Select one person (Student A) in each group to write down the name of a specific plant or animal in the center of the paper. The next student in the group (Student B) writes down a plant/animal that eats or is eaten by the plant/animal written on the paper. Student B connects those two organisms with arrow, the head of the arrow should point towards the prey. Students in the group pass the pencil and paper around and continue building upon any plant or animal written on the paper. (10 minutes)

While the students are working, go around to each group and facilitate a guided discussion using the prompts below.

- Which organisms have the most connections? Which have the least?
- What type of ecosystem do the plants or animals live in? Which share an ecosystem? Which can be found in multiple ecosystems?



Procedure (Continued)

Food Web vs Food Chain

Learning objectives:

- a. A food chain shows how energy is transferred through trophic levels
 - b. A food web is made up of all the food chains in an ecosystem.
2. Instruct the students to put their food webs aside. Don't throw them away, they are needed for the next activity. Pass out two "Trophic Diagrams" to each group. Use the diagram to walk the class through the roles of producers and consumers in a food chain. (5 minutes)

Key messages to share with students:

A food chain shows how nutrients, or energy, flow from one organism to another.

The trophic level is an organism's position in the food chain.

The first trophic level is occupied by producers (organisms that make their own food). The next trophic level is primary consumers that eat producers. An apex predators occupies the highest trophic level.

Animals depend on the trophic level below the one they occupy for energy

3. Provide each group with another piece of paper. Instruct them to work together to create a food chain from the food web diagram they made during the warm-up activity. The trophic levels between producer and apex predator can quickly become convoluted. Direct students to first focus on grouping organisms by three trophic levels (producers, consumers, apex predators). Then, attempt to further separate the consumers. Depending on the animals they started with, groups can choose to make a food chain using only a handful of the consumers from their food web. (10 minutes)

While the students are working, go around to each group and facilitate a guided discussion using the prompts below.

-How many trophic levels are represented?

-How many consumers are represented? What type of consumers are represented (herbivore, carnivore, omnivore)? How many producers are represented?

4. Give 4-5 students the opportunity to share with the class by re-asking some of the questions above, as time allows. (5 minutes)

Salmon Food Web Activity

Learning objectives:

- a. Salmon are a keystone species
 - b. Salmon life cycle stages occupy varying trophic levels
5. Explain that the diagrams the students made first are called food webs. And they used the food webs to make a food chain (3 minutes)



Procedure (Continued)

Key message to share with students:

A food chain only shows a single food path for an animal. A food web shows many paths. A food web demonstrates how species in an ecosystems are interconnected

6. Assign each group a stage of the salmon life cycle. One group can do both eggs and alevin. Stages include egg, alevin, fry, smolt, ocean adult, spawning adult. Pass out a 25x30inch post it (or any available poster paper) and instruct the class to work in their groups to create a food web diagram for the life stage they're assigned. (30 minutes)

7. Conclude the activity with a group discussion about the posters each group made. Using the questions below to guide the discussion. Encourage the class to draw conclusions by looking at the food web they made. (15 minutes)

-Which life stage had the most connections? Which had the least?

-Are there connections between any of the organisms (plant or animal) that you weren't expecting?

-Which trophic levels (producer, consumer or apex predator) would you find each salmon life stage? Note: Salmon eggs and alevin can be considered pseudo-producers since their "food" is contained in their yolk sacs.

8. Use the whiteboard at the front of the class (or even a post-it) to draw a line. On one side of the line write "Animals salmon eat" on the other side write "Animals that eat salmon". Have each group take turns shouting out a plant or animal (other than the life stage they were assigned) on their food web and write it on the board under the correct category. You should have a large group of organisms under both categories at the end. Once all the organisms have been added (or you run out of space to write) use the prompts

below to facilitate a class discussion. (15 minutes)

-What would happen if salmon were removed from the food web?

Key messages to share:

Salmon are an essential food source for over 130 organisms.

This makes them a keystone species, meaning they directly impact the survival of other animals.

Terrestrial and marine ecosystems will collapse if salmon disappear.

-How do humans interfere with the salmon food webs? Habitat destruction, pollution, overfishing, illegal hunting, agriculture are examples of human interference.

Key messages to share:

Negative human interference will result in salmon becoming endangered or extinct.

9. Ask students about their role in protecting salmon. What can they do to protect salmon and their ecosystems? Some ideas the kids have to help keep marine life healthy could include; throwing trash in the garbage can, and recycling in the recycling, or bringing lunch to school in reusable containers. Encourage students to make the connection between their actions and salmon conservation by asking them why or how their idea protects ecosystems. (5 minutes)

Key messages to share with students:

All ecosystems are interconnected. What happens in one ecosystem can positively or negatively affect a different ecosystem.

We all can make small changes in our day-to-day life that will have a huge impact on salmon.



Extensions

Additional Activities

Classroom Food Web

Create a classroom food web using strings of yarn and sticky notes. Have one student (Student A) write down a plant/animal on a sticky note, and put the sticky note on their chest (or forehead if they're feeling silly). On a separate sticky note, the next student (Student B) writes down a plant/animal that eats or is eaten by Student A. Connect those two students using a piece of yarn. Continue with each student in the class, one by one, writing down a plant/animal on the sticky note and using a piece of yarn to connect with a different student. By the end there will generally be one or two people holding FAR more strings than the rest. Those students represent keystone species for the food web they just created. This is a great activity for students to visualize the importance of a keystone species.

Get Specific!

For older students or those with more experience, you can use more advanced vocabulary when discussing the food chain and consumer-resource interactions. The "Wayne Getz Consumer Category Diagram" can be used to guide discussion. Challenge students to name an animal from each category.

Encourage Conservation Stewardship

If you want to provide your students with more examples of how they can protect salmon, check out the "How Can You Help Protect Salmon" document created by the Bureau of Land Management.

Vocabulary to Know

Apex Predator – an animal at the top of the food chain without natural predators of its own

Carnivore – an animal that feed primarily or exclusively on animal tissue, such as muscle or fat

Consumer – an organism that can not produce its owns food and instead must consumer other organisms to survive

Food Chain – a single path that illustrates the flow of nutrients from one trophic level to another

Food Web – multiple paths that illustrate the connection between all the food chains in an ecosystem

Herbivore – animals that feed on producers



Vocabulary (Continued)

Keystone Species – an organism that holds an ecosystem together

Producer – an organism that can produce its own food using light, water, carbon dioxide, or other chemicals

Trophic Level – the position an organism occupies in a food chain or food web

Materials

Included: You can request to borrow laminated versions of the diagrams below
11 – Trophic Diagrams
11 – Wayne Getz Consumer Category Diagrams

Not Included:

Pencil and Paper (Loose Leaf, Notebook or Journal)
5 to 10 computers connected to WiFi (1-2 for each group)
5 – 25" x 30" Post-It Notes (or any paper to make a poster)

Next Generation Science Standards

Life Science

LS2 – Ecosystems: Interactions, Energy, and Dynamics

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

PS3 – Energy

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.



Common Core Standards

English Language Arts

Speaking and Listening

4.1/5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade level topics and texts, building on others' ideas and expressing their own clearly.

4.4/5.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Language Standards

4.4.a/5.4.a Use context (e.g., definitions, examples, or restatements in text) as a clue to the meaning of a word or phrase.

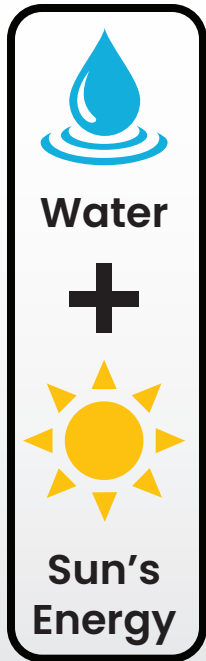
Acknowledgements

Exploring Fish Habitat. Information and Education Program, Puget Sound Olympic Peninsula Fisheries Complex, U.S. Fish and Wildlife Service 2022.

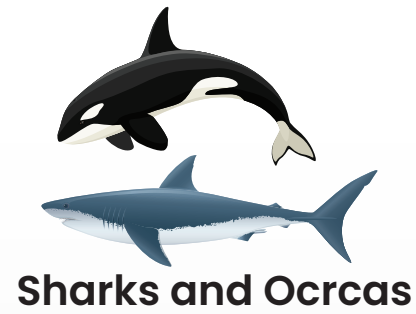
Trophic Diagram



Trophic Level



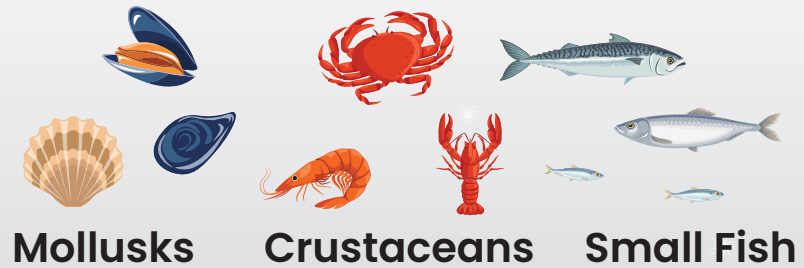
Quaternary Consumers



Tertiary Consumers



Secondary Consumers



Primary Consumers

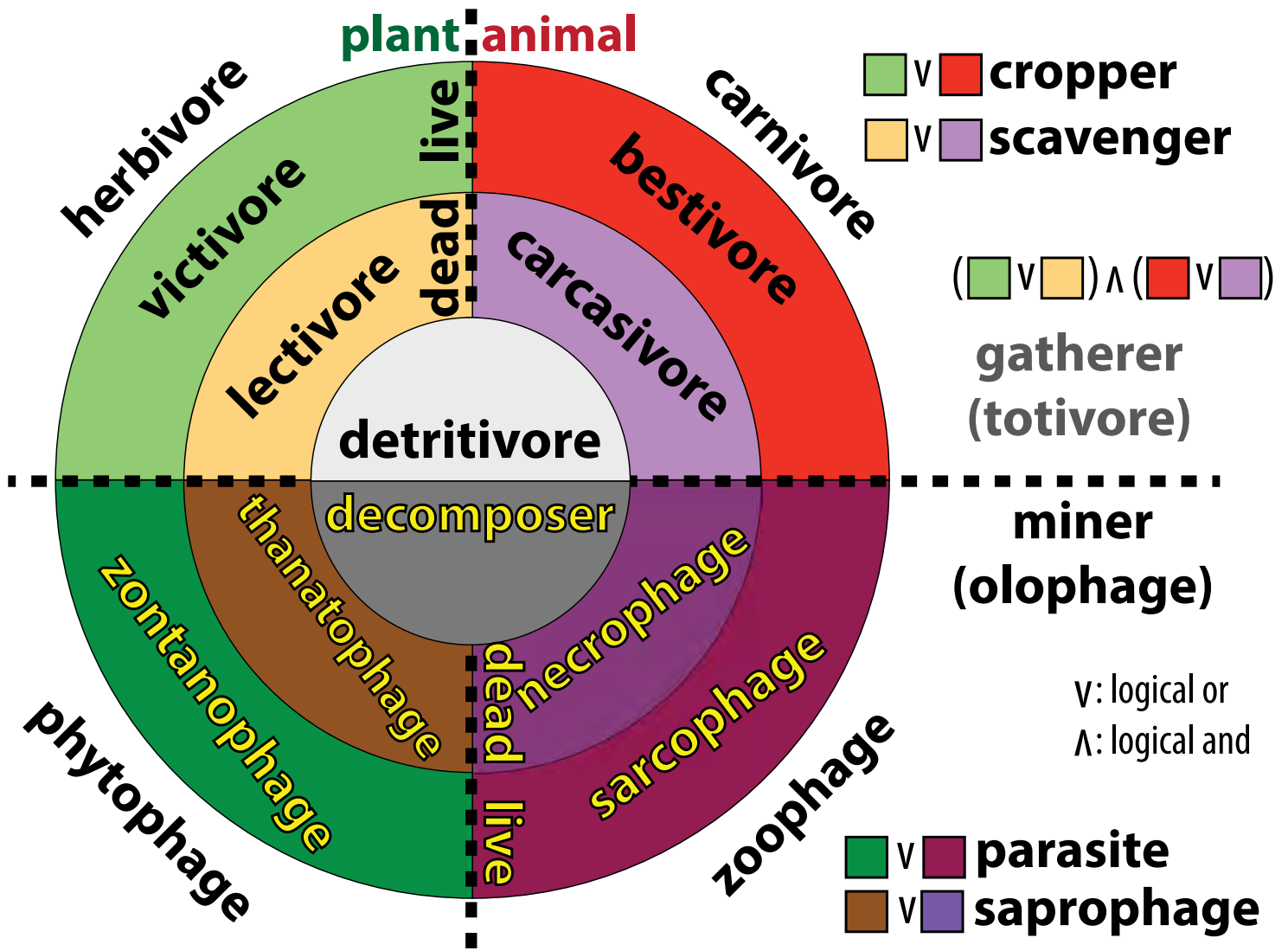


Producers



Wayne Getz Consumer Category Diagram





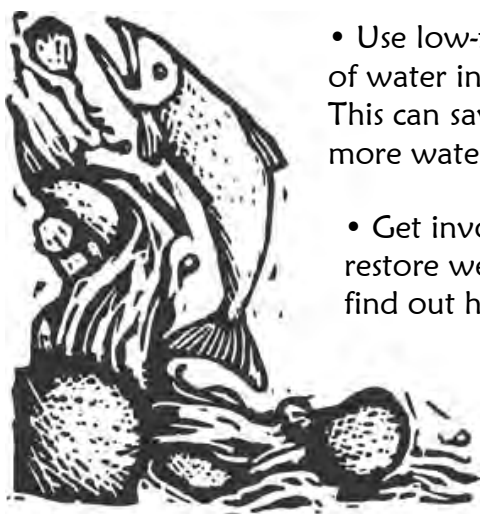
Handout – How Can You Help Protect Salmon



How Can You Help Protect Salmon?



- Use the bus, car pool, ride your bike, or walk whenever and wherever you can! This keeps the air and water clean for all of us, including salmon!
- Limit your shower time and turn off faucets/showers when you are not using them! When you conserve water, you leave more water for the salmon!
- Storm drains go right into our rivers, lakes, and wetlands. Wash your car on the lawn to prevent soap from going into storm drains. Never dump liquids with chemicals down storm drains! Salmon cannot live in polluted water!
- Conserve electricity by turning off the lights when you are not using them! Conserving electricity means less need for dams and more salmon!
- Stay on trails when hiking or riding! Never ride your bike or off-highway-vehicle in creeks or fragile wetlands that are home to salmon.
- Compost and then use the compost instead of fertilizer for your garden and plants! This helps reduce waste and keeps chemicals and fertilizers out of our rivers and streams!
- Plant native plants! Native plants are better adapted to the environment so they need less water and do not need fertilizer or pesticides. This saves water for the salmon and keeps the rivers healthier!
- Be careful what you flush down your toilet or sink! Only flush biodegradable products. Avoid chemicals and try to avoid using the garbage disposal!
Anything you flush or drain makes its way to our streams and rivers.



- Use low-flow toilets and showers, or stick a brick or jug of water in the back of your toilet to make it use less water. This can save $\frac{1}{2}$ gallon of water per flush, which leaves more water for salmon!
- Get involved! Volunteer with your community to help restore wetlands and riparian zones. Contact your city to find out how and where you can volunteer!
- Share what you know! Tell your neighbors, friends, and parents what you've learned and teach them how they can help salmon too!